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PATENT
514413-3843
(Attorney Docket No.)
A

Patent Application Transmittal
(only for new nonprovisional applications
under 37 C.F.R. 1.53(b))
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JC542 U.S. PTO
109195
10/19/00

Date: October 19, 2000

TO: ASSISTANT COMMISSIONER FOR PATENTS
Box PATENT APPLICATION
Washington, D.C. 20231

Sir:

With reference to the filing in the United States Patent and Trademark Office of an application for patent in the names of:

BIERINGER ET AL.

entitled: SYNERGISTIC HERIBICIDAL COMPOSITIONS COMPRISING
HERBICIDES FROM THE GROUP OF THE
HYDROXYPHENYL PYRUVATE DIOXYGENASE INHIBITORS

- This is an application of a small entity under 37 CFR 1.9(f) and the amounts shown in parentheses below have been employed in calculating the fee.
- Small Entity Verified Statement is enclosed.
- Small Entity Verified Statement filed in prior application, status still proper and desired

The following are enclosed:

- Specification (29 pages)
- 17 Claims (including 1 independent claim)
 This application contains multiply dependent claim(s).
- 1 page Abstract
- Sheet(s) of Drawing(s)

PATENT
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- Postcard
 Preliminary Amendment
 Our check in the amount of \$ 710.00, calculated on the basis of the claims as amended by any enclosed preliminary amendment as follows:

Basic Fee \$710.00 (355.00).....	710.00
Total Number of Claims in excess of 20 at \$18.00 (9.00) each	0.00
Number of Independent Claims in excess of 3 at \$80.00 (40.00) each	0.00
Multiple Dependent Claim Fee at \$270.00 (135.00).....	0.00
Total Filing Fee.....	710.00
Assignment Recording Fee \$40.00	0.00

Oath or Declaration and Power of Attorney

New signed unsigned

Copy from prior application (37 C.F.R. 1.63(d))

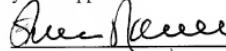
Certified copy of the following application to substantiate the claim for priority
made in the Declaration:

German Application No. 19950943.3 filed October 22, 1999

Please charge any additional fees required for the filing of this application or credit any
overpayment to Deposit Account No. 50-0320.

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants

By: 
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Citizenship: Germany

Attorney Docket No. 514413-3843

New U.S. Patent Application filed **October 19, 2000** for application entitled:

**SYNERGISTIC HERBICIDAL COMPOSITIONS COMPRISING
HERBICIDES FROM THE GROUP OF THE
HYDROXYPHENYL PYRUVATE DIOXYGENASE INHIBITORS**

corresponding to German Application Ser. No. 19950943.3

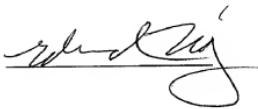
filed October 22, 1999

Express Mail No.: EL585029933US

Date of Deposit: October 19, 2000

I hereby certify that this application and the accompanying papers are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to:

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : BIERINGER et al.
U.S. Serial No. :
Filing Date : Herewith
Title of Invention : SYNERGISTIC HERBICIDAL COMPOSITIONS
COMPRISING HERBICIDES FROM THE GROUP OF
THE HYDROXYPHENYL PYRUVATE DIOXYGENASE
INHIBITORS

745 Fifth Avenue
New York, NY 10151
October 19, 2000

EXPRESS MAIL

Mailing Label Number: EL585029933US

Date of Deposit: October 19, 2000

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Edward Nay

(Typed or printed name of person
mailing paper or fee)

Edward J. Nay
(Signature of person mailing paper or fee)

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Box Patent Application
Washington, D.C. 20231

Dear Sir:

Preliminary to the examination of this U.S. application, please enter the following
amendments:

IN THE CLAIMS:

Claim 16, line 4, please delete "any of claims 1 to 15" and insert --claim 1--; and

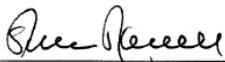
Claim 17, line 3, please delete "any of claims 1 to 15" and insert --claim 1--;

REMARKS

This application includes multiple claim dependencies. The amendment removes the multiple claim dependencies, and the filing fee for this application was computed on the basis that no dependent claim depends from more than one preceding claim.

Entry of this amendment and an early examination on the merits are respectfully solicited.

Respectfully submitted,
FROMMER LAWRENCE & HAUG LLP

By: 
William F. Lawrence
Reg. No. 28,029

Description

- 5 Synergistic herbicidal compositions comprising herbicides from the group of the hydroxyphenylpyruvate dioxygenase inhibitors

The invention is in the field of crop protection compositions which can be used against undesirable vegetation and which comprise, as active compounds, a
10 combination of at least two herbicides.

More specifically, the invention relates to herbicidal compositions which, as active compound, comprise a herbicide from the group of the hydroxyphenylpyruvate dioxygenase inhibitors in combination with at least one further herbicide.

- 15 Herbicides from the abovementioned group of the hydroxyphenylpyruvate dioxygenase inhibitors are known from numerous documents. Recently disclosed inhibitors of this type usually carry a substituted benzoyl radical on a likewise substituted radical from the group consisting of cyclohexanedione, pyrazole,
20 isoxazole, isothiazole and 3-oxopropionitrile. Thus, WO 97/23135 describes benzoylpyrazoles, EP-A 0 810 227 describes benzoylisoxazoles and WO 98/29406 describes benzoylcyclohexanediones having in each case herbicidal action. Further herbicidal benzoyl derivatives are known from WO 00/14087. This document also indicates the mechanism of action, which is the same as for the benzoyl derivatives
25 described in the present invention.

In practice, however, the use of the benzoyl derivatives known from these publications has frequently been associated with disadvantages. Thus, the herbicidal activity of the known compounds is not always satisfactory, or, in the case of
30 satisfactory herbicidal activity, undesirable damage to the useful plants is observed.

The activity of herbicides depends inter alia on the type of herbicide used, its application rate, the preparation, the harmful plants to be controlled in each case,

climatic and soil conditions, etc. A further criterion is the persistency or the rate at which the herbicide is degraded. Changes in the sensitivity of harmful plants to an active compound which may occur on prolonged use or in specific geographical areas may also have to be taken into account. Such changes manifest themselves

- 5 by a more or less pronounced loss in activity and can only be compensated under certain conditions by higher herbicide application rates.

Owing to the large number of possible influencing factors, there is virtually no individual active compound which has all the desired properties for different

- 10 requirements, in particular with respect to the species of harmful plant and the climatic zones. Furthermore, there is the permanent object to achieve the desired effect using more and more reduced herbicide application rates. A lower application rate reduces not only the amount of active compound required for the application, but generally also reduces the amount of formulation auxiliaries required. Both
15 15 reduce the economical expense and improve the ecological compatibility of the herbicide treatment.

A frequently used method for improving the use profile of a herbicide is the combination of the active compound with one or more other active compounds which

- 20 contribute the desired additional properties. However, the combined use of a plurality of active compounds is frequently associated with phenomena of physical and biological incompatibility, for example insufficient stability of a joint formulation, decomposition of an active compound or antagonism of the active compounds. What is desired are, in contrast, active compound combinations having a favorable activity
25 profile, high stability and, if possible, synergistically enhanced activity, thus permitting the application rate to be reduced, compared with the individual application of the active compounds to be combined.

None of the publications mentioned further above discloses that numerous

- 30 compounds from the group of the hydroxyphenylpyruvate dioxygenase inhibitors show synergistic effects when combined with selected other herbicides.

It is an object of the present invention to provide herbicidal compositions having better properties than those of the prior art.

The invention provides herbicidal compositions, comprising an effective amount of

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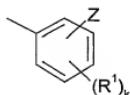
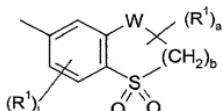
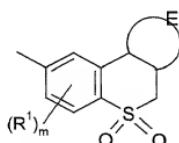
- A) at least one compound of formula (I) and its agriculturally customary salts
(Component A)

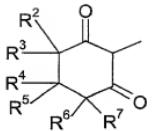
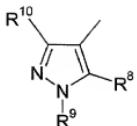
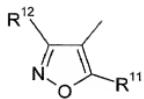
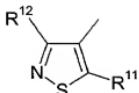
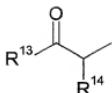


(I),

10 in which

X is a radical X¹, X² or X³

(X¹)(X²)(X³);15 Q is a radical Q¹, Q², Q³, Q⁴ or Q⁵

(Q¹)(Q²)(Q³)(Q⁴)(Q⁵);

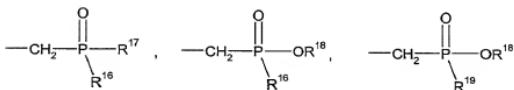
Z is a radical Z¹, CH₂-Z¹ or Z²;

- 5 Z¹ is a five- to ten-membered monocyclic or bicyclic saturated, partially saturated, fully unsaturated or aromatic ring which is attached via carbon or nitrogen and which, in addition to carbon atoms, contains 1, 2, 3 or 4 heteroatoms from the group consisting of oxygen, sulfur and nitrogen and which is unsubstituted or mono- or polysubstituted by halogen, cyano, nitro, cyano-(C₁-C₄)-alkyl, CO-R¹⁵, (C₁-C₄)-alkyl, halo-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkyl, (C₁-C₄)-alkoxy, halo-(C₁-C₄)-alkoxy, (C₁-C₄)-alkylthio, halo-(C₁-C₄)-alkylthio, di-(C₁-C₄)-alkylamino, by phenyl which is optionally mono- or polysubstituted by halogen, cyano, nitro, (C₁-C₄)-alkyl or halo-(C₁-C₄)-alkyl or by an oxo group;
- 10 10 Z² is (C₃-C₁₂)-cycloalkyloxy-(C₁-C₄)-alkyl, aryloxy-(C₁-C₄)-alkyl, heteroaryloxy-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, aryl-(C₃-C₈)-cycloalkylthio-(C₁-C₄)-
- 15

alkyl, heteroaryl-(C₃-C₈)-cycloalkylthio-(C₁-C₄)-alkyl, heterocycl-(C₃-C₈)-cycloalkylthio-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylsulfinyl-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylsulfonyl-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylamino-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylsulfonyloxy-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylsulfonylamino-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylcarbonyl-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylcarbonyloxy-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkoxycarbonyl-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylcarbonylamino-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylaminocarbonyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylthio-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylsulfinyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylsulfonyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylaminocarbonyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylcarbonyloxy-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkoxycarbonyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylcarbonylamino-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylaminocarbonyl-(C₁-C₄)-alkyl, arylthio-(C₁-C₄)-alkyl, arylsulfinyl-(C₁-C₄)-alkyl, arylsulfonyl-(C₁-C₄)-alkyl, arylamino-(C₁-C₄)-alkyl, arylsulfonyloxy-(C₁-C₄)-alkyl, arylsulfonylamino-(C₁-C₄)-alkyl, arylcarbonyl-(C₁-C₄)-alkyl, arylcarbonyloxy-(C₁-C₄)-alkyl, aryloxycarbonyl-(C₁-C₄)-alkyl, arylcarbonylamino-(C₁-C₄)-alkyl, arylaminocarbonyl-(C₁-C₄)-alkyl, heteroarylthio-(C₁-C₄)-alkyl, heteroarylsulfinyl-(C₁-C₄)-alkyl, heteroarylsulfonyl-(C₁-C₄)-alkyl, heteroarylaminocarbonyl-(C₁-C₄)-alkyl, heteroarylcarbonyloxy-(C₁-C₄)-alkyl, heteroaryloxycarbonyl-(C₁-C₄)-alkyl, heteroarylcarbonylamino-(C₁-C₄)-alkyl, heteroarylaminocarbonyl-(C₁-C₄)-alkyl, alkyl, heterocyclithio-(C₁-C₄)-alkyl, heterocyclsulfinyl-(C₁-C₄)-alkyl,

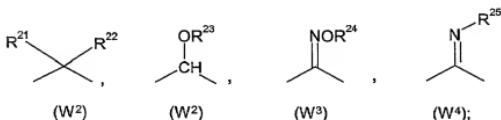
heterocyclsulfonyl-(C₁-C₄)-alkyl, heterocyclamino-(C₁-C₄)-alkyl,
heterocyclsulfonyloxy-(C₁-C₄)-alkyl, heterocyclsulfonylamino-(C₁-C₄)-alkyl,
heterocyclcarbonyl-(C₁-C₄)-alkyl, heterocyclcarbonyloxy-(C₁-C₄)-alkyl,
heterocycloxycarbonyl-(C₁-C₄)-alkyl, heterocyclcarbonylamino-(C₁-C₄)
5 alkyl, heterocyclaminocarbonyl-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkylthio-(C₁-C₄)-
alkyl, halo-(C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkylsulfonyl-
(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkylamino-(C₁-C₄)-alkyl, halo-(C₁-C₄)-
alkylsulfonyloxy-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkylsulfonylamino-(C₁-C₄)-alkyl,
halo-(C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkylcarbonyloxy-
10 (C₁-C₄)-alkyl, halo-(C₁-C₄)-alkyloxycarbonyl-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkyl-
carbonylamino-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkylaminocarbonyl-(C₁-C₄)-alkyl,
aryl-(C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl,
aryl-(C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylamino-(C₁-C₄)-alkyl,
aryl-(C₁-C₄)-alkylsulfonyloxy-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylsulfonylamino-
15 (C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-
alkylcarbonyloxy-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkyloxycarbonyl-(C₁-C₄)-alkyl,
aryl-(C₁-C₄)-alkylcarbonylamino-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylamino-
carbonyl-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-
20 alkylsulfinyl-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkylamino-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-
alkylsulfonyloxy-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkylsulfonylamino-(C₁-C₄)-
alkyl, heteroaryl-(C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-
alkylcarbonyloxy-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkoxycarbonyl-(C₁-C₄)-
alkyl, heteroaryl-(C₁-C₄)-alkylcarbonylamino-(C₁-C₄)-alkyl, heteroaryl-(C₁-
25 C₄)-alkylaminocarbonyl-(C₁-C₄)-alkyl, heterocycl-(C₁-C₄)-alkylthio-(C₁-C₄)-

alkyl, heterocyclyl-(C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylamino-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylsulfonyloxy-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylsulfonylamino-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylcarbonyloxy-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkoxycarbonyl-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylcarbonylamino-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylaminocarbonyl-(C₁-C₄)-alkyl,



or $O-(CH_2)_p-O-(CH_2)_wR^{20}$;

W is one of the groups W^1 , W^2 , W^3 or W^4



Y is O or NR^2 ;

E together with the two carbon atoms to which it is attached is a phenyl ring or a 5- or 6-membered heterocycle which may be saturated, partially saturated, fully unsaturated or aromatic and contains 1, 2 or 3 heteroatoms from the group consisting of oxygen, sulfur and nitrogen, where the heterocycle contains not more than 2 sulfur or 2 oxygen atoms and the phenyl ring or heterocycle which contains the group E is unsubstituted or mono- or polysubstituted by (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy, halo-(C₁-

C_6)-alkoxy, (C_1 - C_6)-alkylthio, halo-(C_1 - C_6)-alkylthio, (C_1 - C_6)-alkylsulfinyl, halo-(C_1 - C_6)-alkylsulfinyl, (C_1 - C_6)-alkylsulfonyl, halo-(C_1 - C_6)-alkylsulfonyl, aminosulfonyl, (C_1 - C_6)-alkylaminosulfonyl, (C_2 - C_{12})-dialkylaminosulfonyl, $NR^{26}R^{27}$, (C_2 - C_6)-alkoxyalkyl, (C_2 - C_6)-alkoxycarbonyl, (C_2 - C_6)-alkylcarbonyl, halogen, cyano, nitro or by pyridyl;

R^1 is halogen, cyano, nitro, (Y)_n-S(O)_q-R²⁸, (Y)_n-CO-R¹⁵ or is (C_1 - C_6)-alkyl, (C_2 - C_6)-alkenyl, (C_2 - C_6)-alkynyl or (C_1 - C_4)-alkoxy which are substituted by V halogen atoms or K (C_1 - C_4)-alkoxy groups;

R^2 , R^3 , R^5 and R^7 independently of one another are hydrogen or (C_1 - C_6)-alkyl;

R^4 is hydrogen, or is (C_1 - C_6)-alkyl, (C_3 - C_6)-cycloalkyl, tetrahydropyran-3-yl, tetrahydropyran-4-yl or tetrahydrothiopyran-3-yl which are substituted by K radicals from the group consisting of halogen, (C_1 - C_6)-alkylthio and (C_1 - C_6)-alkoxy;

R^6 is hydrogen, (C_1 - C_6)-alkyl or CO₂R¹⁵, or

R^4 and R^6 together form a bond or a three- to six-membered carbocyclic ring;

R^8 is OR²⁹, thio, (C_1 - C_6)-alkylthio, halo-(C_1 - C_6)-alkylthio, (C_1 - C_6)-alkylsulfinyl, halo-(C_1 - C_6)-alkylsulfinyl, (C_1 - C_6)-alkylsulfonyl, halo-(C_1 - C_6)-alkylsulfonyl, halogen, NR²⁶R²⁷, phenylthio, phenylsulfonyl or phenylcarbonylmethylthio, where the three last-mentioned groups are substituted by K radicals from the group consisting of (C_1 - C_3)-alkyl, halogen, cyano and nitro;

⁹ R⁹ is hydrogen, (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, CH₂CH₂OR³⁰ or is phenyl or benzyl which are substituted in the phenyl ring by K radicals from the group consisting of (C₁-C₃)-alkyl, halogen, cyano and nitro;

5

R¹⁰ is hydrogen, (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy, halo-(C₁-C₆)-alkoxy, halogen, cyano or nitro;

R¹¹ is hydrogen, (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl or halo-(C₃-C₆)-cycloalkyl;

R¹² is hydrogen, (C₂-C₆)-alkoxycarbonyl, halo-(C₂-C₆)-alkoxycarbonyl, S(O)_qR²⁸, CO₂H or cyano;

15 R¹³ is (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl, halo-(C₃-C₆)-cycloalkyl or is (C₃-C₆)-cycloalkyl which is substituted by a radical (C₁-C₃)-alkyl;

20 R¹⁴ is cyano, (C₂-C₆)-alkoxycarbonyl, (C₂-C₆)-alkylcarbonyl, S(O)_qR³⁰ or C(O)NR²⁶R²⁷;

R¹⁵ is (C₁-C₄)-alkyl, halo-(C₁-C₄)-alkyl or NR²⁶R²⁷;

25 R¹⁶ and R¹⁷ independently of one another are (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, halo-(C₁-C₆)-alkyl, aryl or aryl-(C₁-C₆)-alkyl which are substituted by K radicals from the group consisting of halogen, cyano, nitro, (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy and halo-(C₁-C₆)-alkoxy;

R¹⁸ and R¹⁹ independently of one another are hydrogen or R¹⁶, or

R¹⁸ and R¹⁹ together form a (C₂-C₅)-alkenyl chain;

5 R²⁰ is (C₁-C₄)-alkyl, (C₂-C₈)-alkenyl, (C₂-C₆)-alkynyl, halo-(C₁-C₆)-alkyl, halo-

(C₂-C₆)-alkenyl, halo-(C₂-C₆)-alkynyl, (C₁-C₆)-alkoxy, (C₂-C₆)-alkenyloxy,

(C₂-C₆)-alkynyoxy, halo-(C₁-C₆)-alkoxy, halo-(C₂-C₆)-alkynyoxy or halo-

(C₂-C₆)-alkenyloxy;

10 R²¹ is hydrogen, (C₁-C₄)-alkyl, halo-(C₁-C₄)-alkyl, Z¹, O-Z¹, S-Z¹ or NR³⁰Z¹;

15 R²² is hydrogen, (C₁-C₄)-alkyl, (C₂-C₄)-alkenyl or (C₂-C₄)-alkynyl, or

R²¹, R²² together with the carbon atom to which they are attached form a carbonyl

group or an O-CH₂CH₂-O group which is substituted by 9 (C₁-C₃)-alkyl

radicals, or R²¹ is hydrogen and R²² is Z¹;

20 R²³ and R²⁴ independently of one another are (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl,

(C₃-C₆)-cycloalkyl, (C₂-C₆)-alkenyl, halo-(C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl,

halo-(C₂-C₆)-alkynyl or Z¹;

25

R²⁵ is Z¹;

R²⁶ is hydrogen or (C₁-C₆)-alkyl;

25 R²⁷ is hydrogen, (C₁-C₆)-alkyl or (C₁-C₆)-alkoxy, or

R²⁶ and R²⁷ together form (CH₂)₂, (CH₂)₃, (CH₂)₄, (CH₂)₅, or (CH₂)₂O(CH₂)₂;

R²⁸ is (C₁-C₄)-alkyl, halo-(C₁-C₄)-alkyl or NR²⁶R²⁷;

R²⁹ is hydrogen, (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl, (C₂-C₆)-alkoxyalkyl, formyl,

5 (C₂-C₆)-alkylcarbonyl, (C₂-C₆)-alkoxycarbonyl, C(O)NR²⁶R²⁷, (C₁-C₆)-alkylsulfonyl, halo-(C₁-C₆)-alkylsulfonyl, or is phenyl, benzyl, benzoyl, CH₂C(O)phenyl or phenylsulfonyl which are substituted in the phenyl ring by K radicals from the group consisting of (C₁-C₃)-alkyl, halogen, cyano and nitro;

10 R³⁰ is (C₁-C₆)-alkyl or (C₁-C₆)-alkoxy;

a is 0, 1, 2, 3 or 4;

b is 1 or 2;

15 k is 0, 1, 2 or 3;

l is 0, 1 or 2;

20 m is 0 or 1;

n is 0 or 1;

p is 1, 2 or 3;

25 q is 0, 1 or 2;

v is 0, 1, 2, 3, 4 or 5,

30 w is 0, 1, 2 or 3,

and

- B) at least one compound (Component B) from one of the groups
- 5 B-a) herbicides which are selectively active in cereals against monocotyledonous and/or dicotyledonous harmful plants,
- B-b) herbicides which are selectively active in corn against monocotyledonous and/or dicotyledonous harmful plants,
- 10 B-c) herbicides which are selectively active in rice against monocotyledonous and/or dicotyledonous harmful plants,
- B-d) herbicides which are nonselectively active in land which is not under cultivation and/or selectively active in transgenic crops against monocotyledonous and/or dicotyledonous harmful plants,

15 where these compositions comprise the compounds of the formula (I) or their salts (Component A) and the compounds of groups B-a) to B-d) (Component B) in a ratio by weight of from 1:2000 to 2000:1.

In formula (I) and in all subsequent formulae, carbon-containing radical chains such as alkyl, alkoxy, haloalkyl, haloalkoxy, alkylamino and alkylthio and the
 20 corresponding radicals which are unsaturated and/or substituted in the carbon skeleton, such as alkenyl and alkynyl, can in each case be straight-chain or branched. Unless specifically indicated otherwise, the lower carbon skeletons, for example having 1 to 6 C atoms or, in the case of unsaturated groups, having 2 to 4 C atoms, are preferred for these radicals. Alkyl radicals, also in the composed meanings, such as alkoxy, haloalkyl, etc., are, for example, methyl, ethyl, n- or i-propyl, n-, i-, t- or 2-butyl, pentyls, hexyls, such as n-hexyl, i-hexyl and 1,3-dimethylbutyl, heptyls, such as n-heptyl, 1-methylhexyl and 1,4-dimethylpentyl; alkenyl and alkynyl radicals have the meaning of the possible unsaturated radicals which correspond to the alkyl radicals; alkenyl is, for example, allyl,
 30 1-methylprop-2-en-1-yl, 2-methyl-prop-2-en-1-yl, but-2-en-1-yl, but-3-en-1-yl, 1-methyl-but-3-en-1-yl and 1-methyl-but-2-en-1-yl; alkynyl is, for example, propargyl, but-2-yn-1-yl, but-3-yn-1-yl, 1-methyl-but-3-yn-1-yl. The multiple bond can be in any position of the unsaturated radical.

Unless indicated otherwise, cycloalkyl is a carbocyclic saturated ring system having three to nine C atoms, for example cyclopropyl, cyclopentyl or cyclohexyl.

- Analogously, cycloalkenyl is a monocyclic alkenyl group having three to nine carbon
5 ring members, for example cyclopropenyl, cyclobutenyl, cyclopentenyl and cyclohexenyl, where the double bond can be in any position.

In the case of a disubstituted amino group, such as dialkylamino, these two substituents can be identical or different.

10

Halogen is fluorine, chlorine, bromine or iodine. Haloalkyl, -alkenyl and -alkynyl is alkyl, alkenyl and alkynyl, respectively, which is partially or fully substituted by halogen, preferably by fluorine, chlorine and/or bromine, in particular by fluorine or chlorine, for example CF₃, CHF₂, CH₂F, CF₃CF₂, CH₂FCHCl, CCl₃, CHCl₂,

- 15 CH₂CH₂Cl; haloalkoxy is, for example, OCF₃, OCHF₂, OCH₂F, CF₃CF₂O,
OCH₂CF₃ and OCH₂CH₂Cl; this applies correspondingly to haloalkenyl and other halogen-substituted radicals.

- 20 The term "heterocyclyl" is to be understood as meaning the radicals of three- to nine-membered saturated, partially or fully unsaturated heterocycles which contain one to three heteroatoms selected from the group consisting of oxygen, nitrogen and sulfur. If chemically possible, these radicals can be attached at any position of the heterocycle. Heterocyclyl is preferably aziridinyl, oxiranyl, tetrahydrofuranyl, tetrahydropyranyl, tetrahydrothienyl, pyrrolidinyl, isoxazolidinyl, isoxazolinyl,
25 thiazolinyl, thiazolidinyl, pyrazolidinyl, morpholinyl, piperidinyl, dioxolanyl, dioxanyl, piperazinyl, oxepanyl, azepanyl.

- 30 Heteroaryl is the radical of a heteroaromatic compound which, in addition to carbon ring members, contains one to five heteroatoms from the group consisting of nitrogen, oxygen and sulfur. Heteroaryl is preferably furanyl, thieryl, pyrrolyl, pyrazolyl, imidazolyl, oxazolyl, thiazolyl, isoxazolyl, isothiazolyl, 1,2,3-triazolyl, 1,2,4-triazolyl, 1,2,3-oxadiazolyl, 1,2,4-oxadiazolyl, 1,2,5-oxadiazolyl, 1,3,4-oxadiazolyl,

1,2,3-thiadiazolyl, 1,2,4-thiadiazolyl, 1,2,5-thiadiazolyl, 1,3,4-thiadiazolyl, tetrazolyl, pyridyl, pyridazinyl, pyrimidinyl, pyrazinyl, 1,2,4-triazinyl, 1,3,5-triazinyl.

Aryl is an aromatic mono- or polycyclic hydrocarbon radical, for example phenyl,

- 5 naphthyl, biphenyl and phenanthryl.

The term "partially or fully halogenated" is meant to express that some or all of the hydrogen atoms in the groups characterized in this manner can be replaced by identical or different halogen atoms as mentioned above.

10

If a group or a radical is polysubstituted, this is to be understood as meaning that when the different substituents are combined, the general principles of the construction of chemical compounds have to be followed, i.e. that no compounds are formed which are known to the person skilled in the art to be chemically unstable or not possible. This also applies accordingly to the attachment of individual radicals.

15

Depending on static and/or electronic effects an oxo group may also be present in the tautomeric form, as enol group.

20

If a group or a radical is polysubstituted by other radicals, these other radicals can be identical or different.

25

If a group or a radical is mono- or polysubstituted without the number and the type of substituents being given in detail, this is to be understood as meaning that this group or this radical is substituted by one or more identical or different radicals selected from the group consisting of halogen, hydroxyl, cyano, nitro, formyl, carboxyl, amino, thio, (C₁-C₆)-alkyl, (C₁-C₆)-alkoxy, halo-(C₁-C₆)-alkyl, halo-(C₁-C₆)-alkoxy, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, (C₂-C₆)-alkenyloxy, (C₂-C₆)-alkynyoxy, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkoxy, (C₁-C₆)-alkylthio, halo-(C₁-C₆)-alkylthio.

30

Depending on the type and the attachment of the substituents, the compounds of the formula I can be present as stereoisomers. If, for example, one or more alkenyl

groups are present, diastereomers may exist. If, for example, one or more asymmetrically substituted carbon atoms are present, enantiomers and diastereomers may exist. From the mixtures produced in the preparation, stereoisomers can be obtained by customary separation methods, for example by

- 5 chromatographic separation procedures. Stereoisomers can also be prepared selectively by using stereoselective reactions and employing optically active starting materials and/or auxiliaries. The invention also relates to all stereoisomers and mixtures thereof which are embraced by the formula I but not defined specifically.
- 10 Of more interest are herbicidal compositions which comprise as Component A) a compound of the formula (I) in which Q is one of the radicals Q^1 , Q^2 , Q^3 or Q^4 .

Of particular interest are herbicidal compositions which comprise as Component A) a compound of the formula (I) in which Q is one of the radicals Q^1 , Q^2 or Q^3 ,

- 15 preferably Q^1 or Q^3 .

Of particular interest are likewise herbicidal compositions which comprise as Component A) a compound of the formula (I), in which X is a radical X^1 .

- 20 From the group B-a), the herbicides amidosulfuron, bentazone, bromoxynil, carfentrazone-ethyl, chlortoluron, clodinafop, cloransulam-methyl, diclofop-methyl, fenoxaprop-P-ethyl, florasulam, flufenacet, fluoroglycofen-ethyl, flupyrifluron-methyl-sodium, iodosulfuron, isoproturon, metsulfuron, pendimethalin, pyraflufen-ethyl, sulfosulfuron, thifensulfuron, tralkoxydim, tribenuron, the herbicide 2-amino-4-
- 25 (1-fluoro-1-methylethyl)-6-(3-phenyl-1-cyclobutyl-1-propylamino)-1,3,5-triazine known from WO 97/08156 and the herbicide N-[(4,6-dimethoxy-pyrimidin-2-yl)-aminocarbonyl]-2-methoxycarbonyl-5-methylsulfonylaminomethylbenzenesulfonamid known from WO 95/10507 are particularly suitable for controlling monocotyledonous and/or dicotyledonous harmful plants in cereals.

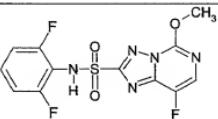
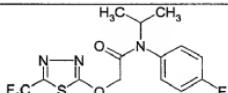
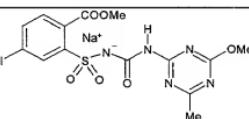
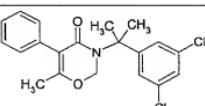
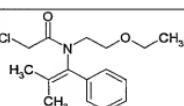
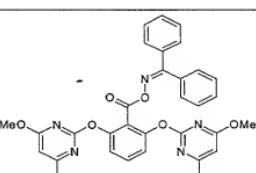
- 30 Very particularly suitable are bromoxynil, clodinafop, fenoxaprop-P-ethyl, iodosulfuron, pyraflufen-ethyl, tralkoxydim, 2-amino-4-(1-fluoro-1-methylethyl)-6-(3-

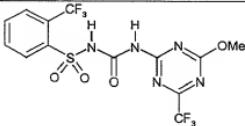
phenyl-1-cyclobutyl-1-propylamino)-1,3,5-triazine and sulfonyl ureas of the formula (II).

- From the group B-b), the herbicides acetochlor, alachlor, atrazine, bromoxynil,
 5 carfentrazone-ethyl, dicamba, diflufenzopyr, dimethenamid, flufenacet, flumetsulam, fluthiacet-methyl, halosulfuron, imazamox, imazapyr, imazaquin, imazethapyr, iodosulfuron, metolachlor, metosulam, metribuzin, nicosulfuron, pethoxamid, pendimethalin, primisulfuron, prosulfuron, pyridate, rimsulfuron, thengylchlor, thifensulfuron-methyl, tritosulfuron and N-[(4,6-dimethoxypyrimidin-2-yl)-
 10 aminocarbonyl]-2-dimethylaminocarbonyl-5-formylbenzenesulfonamide are particularly suitable for controlling monocotyledonous and/or dicotyledonous harmful plants in corn.
- Very particularly suitable are bromoxynil, dicamba, diflufenzopyr, iodosulfuron, nicosulfuron, rimsulfuron and N-[(4,6-dimethoxypyrimidin-2-yl)-aminocarbonyl]-2-
 15 dimethylaminocarbonyl-5-formylbenzenesulfonamide.
- From the group B-c) the herbicides anilofos, azimsulfuron, benfuresate, bensulfuron, bentazon, benthiocarb, bromobutide, bispyribac-sodium, butachlor, cinosulfuron, clomazone, cyclosulfamuron, ethoxysulfuron, esprocarb, imazosulfuron, KPP-314,
 20 pyribenzoxim, mefenacet, molinate, oxaziclofene, OK9701, oxadiargyl, pretilachlor, propanil, pyrazosulfuron, quinclorac, thengylchlor, triclopyr and the herbicide 1-(3-chloro-4,5,6,7-tetrahydropyrazolo-[1,5-a]-pyrid-2-yl)-5-(methylpropargylamino)-4-pyrazolylcarbonitrile known from EP-A 0 863 705 are particularly suitable for controlling monocotyledonous and/or dicotyledonous harmful
 25 plants in rice.
- Very particularly suitable are benfuresate, bensulfuron, ethoxysulfuron, molinate, oxaziclofene and 1-(3-chloro-4,5,6,7-tetrahydropyrazolo-[1,5-a]-pyrid-2-yl)-5-(methylpropargylamino)-4-pyrazolylcarbonitrile.
- 30 From the group B-d), the herbicides glufosinate, glyphosate, imazamox, imazapyr, imazaquin, imazethapyr and sulfosate are particularly suitable for controlling monocotyledonous and/or dicotyledonous harmful plants on land which is not under

cultivation and/or selectively in transgenic crops. Very particularly suitable are glufosinate and glyphosate.

- The active compounds mentioned above by their common names are known, for example, from "The Pesticide Manual", 11th edition, 1997, British Crop Protection Council, and/or are shown in the table below:

Common name or Code No.	Structure
florasulam	
flufenacet	
iodosulfuron	
oxazidomfone (MY 100)	
pethoxamid	
pyribenzoxim (LGC40863)	

Common name or Code No.	Structure
tritosulfuron	

In the combinations according to the invention, application rates in the range from 1 to 2000 g, preferably from 10 to 500 g, of active ingredient per hectare (ai/ha) of the Component A) and from 1 to 2000 g, preferably from 1 to 500 g of the Component B)

5 are generally required.

The weight ratios of the Components A) to B) to be used can be varied within wide ranges. The ratio is preferably in the range from 1:50 to 500:1, in particular in the range from 1:20 to 50:1. Optimum weight ratios may depend on the particular field of application, on the weed spectrum and the active compound combination used and can be determined in preliminary experiments.

10

The compositions according to the invention can be employed for the selective control of annual and perennial monocotyledonous and dicotyledonous harmful

15 plants in crops of cereals (for example barley, oats, rye, wheat), corn and rice and in crops of transgenic useful plants or crops of useful plants selected by classical means which are resistant to active compounds A) and B). Likewise, they can be

employed for controlling undesirable harmful plants in plantation crops such as oil palm, coconut palm, Indian-rubber tree, citrus, pineapples, cotton, coffee, coca and

20 the like, and also in fruit production and viticulture.

The compositions according to the invention act against a broad spectrum of weeds.

They are suitable, for example, for controlling annual and perennial harmful plants such as, for example, from the species abutilon, alopecurus, avena, chenopodium,

25 cynodon, cyperus, digitaria, echinochloa, elymus, galium, ipomoea, lamium, matricaria, scirpus, setaria, sorghum, veronica, viola and xanthium.

The herbicidal compositions according to the invention are also distinguished by the fact that the effective dosages of the Components A) and B) used in the combinations are reduced with respect to an individual dosage, so that it is possible to reduce the required active compound application rates.

5

The invention also provides a method for controlling undesirable vegetation, which method comprises applying one or more herbicides A) together with one or more herbicides B) to the harmful plants, parts thereof or to the area under cultivation.

- 10 When herbicides of Type A) and B) are applied jointly, superadditive (= synergistic) effects are observed. The activity in the combinations is more pronounced than the expected sum of the activities of the individual herbicides employed and the activity of the particular individual herbicide A) and B). The synergistic effects permit the application rate to be reduced, a broader spectrum of broad-leaved weeds and weed
- 15 grasses to be controlled, more rapid onset of the herbicidal action, a more prolonged action, better control of the harmful plants by only one application, or few applications, and widening of the period of time within which the product can be used. These properties are required in weed control practice to keep agricultural crops free from undesirable competing plants and thus to ensure and/or to increase
- 20 quality and quantity of the yields. These novel combinations markedly surpass the prior art with respect to the described properties.

- The active compound combinations according to the invention can either be present as mixed formulations of the Components A) and B), if appropriate together with
- 25 other customary formulation auxiliaries, which mixed formulations are then applied in the usual manner in the form of a dilution with water, or else they can be prepared in the form of so-called tank mixes by joint dilution with water of the components which are formulated separately, or partly separately.
- 30 The Components A) and B) can be formulated in various ways, depending on the prevailing biological and/or physicochemical parameters. Suitable general possibilities for formulations are, for example: wettable powders (WP), emulsifiable concentrates (EC), aqueous solutions (SL), emulsions (EW) such as oil-in-water and

water-in-oil emulsions, sprayable solutions or emulsions, oil- or water-based dispersions, suspoemulsions, dusts (DP), seed dressing products, granules for soil application or for broadcasting or water-dispersible granules (WG), ULV formulations, microcapsules or waxes.

5

The individual types of formulation are known in principle and are described, for example, in: Winnacker-Küchler, "Chemische Technologie" [Chemical Technology], Vol. 7, C. Hauser Verlag Munich, 4th Ed. 1986; van Valkenburg, "Pesticides Formulations", Marcel Dekker N.Y., 1973; K. Martens, "Spray Drying Handbook", 3rd

- 10 Ed. 1979, G. Goodwin Ltd. London. The formulation auxiliaries required, such as inert materials, surfactants, solvents and other additives, are also known and are described, for example, in: Watkins, "Handbook of Insecticide Dust Diluents and Carriers", 2nd Ed., Darland Books, Caldwell N.J.; H.v. Olphen, "Introduction to Clay Colloid Chemistry"; 2nd Ed., J. Wiley & Sons, N.Y.; Marsden, "Solvents Guide", 2nd
15 Ed., Interscience, N.Y. 1950; McCutcheon's, "Detergents and Emulsifiers Annual", MC Publ. Corp., Ridgewood N.J.; Sisley and Wood, "Encyclopedia of Surface Active Agents", Chem. Publ. Co. Inc., N.Y. 1964; Schönfeldt, "Grenzflächenaktive Äthylenoxidaddukte" [Surface-active ethylene oxide adducts], Wiss. Verlagsgesellschaft, Stuttgart 1976; Winnacker-Küchler, "Chemische Technologie"
20 [Chemical Technology], Vol. 7, C. Hauser Verlag Munich, 4th Ed. 1986.

- Based on these formulations, it is also possible to prepare combinations with other pesticidally active substances, such as other herbicides, fungicides or insecticides, and also safeners, fertilizers and/or growth regulators, for example in the form of a
25 ready mix or tank mix.

- Wettable powders are preparations which are uniformly dispersible in water and which, besides the active compound, also comprise ionic or nonionic surfactants (wetting agents, dispersants), for example polyethoxylated alkylphenols,
30 polyethoxylated fatty alcohols or fatty amines, alkanesulfonates or alkylbenzenesulfonates, sodium lignosulfonate, sodium 2,2'-dinaphthylmethane-6,6'-disulfonate, sodium dibutylnaphthalenesulfonate or else sodium oleoylmethyltaurinate, in addition to a diluent or an inert substance.

Emulsifiable concentrates are prepared by dissolving the active compound in an organic solvent, for example butanol, cyclohexanone, dimethylformamide, xylene or else higher-boiling aromatics or hydrocarbons, with the addition of one or more 5 ionic or nonionic surfactants (emulsifiers). Examples of emulsifiers which can be used are: calcium alkylarylsulfonates, such as calcium dodecylbenzenesulfonate, or nonionic emulsifiers, such as fatty acid polyglycol esters, alkylaryl polyglycol ethers, fatty alcohol polyglycol ethers, propylene oxide/ethylene oxide condensates, alkyl polyethers, sorbitan fatty acid esters, polyoxyethylene sorbitan fatty acid esters or 10 polyoxyethylene sorbitol esters.

Dusts are obtained by grinding the active compound with finely divided solid materials, for example talc, natural clays, such as kaolin, bentonite and pyrophyllite, or diatomaceous earth.

- 15 Granules can be prepared either by spraying the active compound onto absorptive, granulated inert material, or by applying active compound concentrates to the surface of carriers, such as sand, kaolinite or granulated inert material, with the aid of binders, for example polyvinyl alcohol, sodium polyacrylate or else mineral oils.
- 20 Suitable active compounds can also be granulated in the manner customary for the preparation of fertilizer granules, if desired as a mixture with fertilizers. Water-dispersible granules are, in general, prepared by processes such as spray-drying, fluidized-bed granulation, disk granulation, mixing using high-speed mixers, and extrusion without solid inert material.
- 25 The agrochemical preparations generally comprise from 0.1 to 99 percent by weight, in particular from 0.2 to 95% by weight, of active compounds of types A) and B), the following concentrations being customary, depending on the type of formulation: In wettable powders, the active compound concentration is, for example, approximately 30 10 to 95% by weight, the remainder to 100% by weight being composed of customary formulation components. In the case of emulsifiable concentrates, the active compound concentration can be, for example, from 5 to 80% by weight. Formulations in the form of dusts in most cases comprise from 5 to 20% by weight of

active compound, sprayable solutions approximately 0.2 to 25% by weight of active compound. In the case of granules, such as dispersible granules, the active compound content depends partly on whether the active compound is in liquid or solid form and on which granulation auxiliaries and fillers are used. In general, the

- 5 content in the water-dispersible granules amounts to between 10 and 90% by weight. In addition, the active compound formulations mentioned comprise, if appropriate, the tackifiers, wetting agents, dispersants, emulsifiers, preservatives, antifreeze agents, solvents, fillers, colorants, carriers, antifoams, evaporation inhibitors and pH or viscosity regulators which are customary in each case.

10

For use, the formulations, which are in commercially available form, are, if appropriate, diluted in a customary manner, for example using water in the case of wettable powders, emulsifiable concentrates, dispersions and water-dispersible granules. Preparations in the form of dusts, soil granules, granules for spreading and sprayable solutions, are conventionally not diluted any further with other inert substances prior to use.

15

The active compounds can be applied to the plants, parts of the plants, seeds of the plants or the area under cultivation (tilled soil), preferably to the green plants and parts of the plants and, if desired, additionally to the tilled soil.

20

A possible use is the joint application of the active compounds in the form of tank mixes, where the concentrated formulations of the individual active substances, in the form of their optimal formulations, are mixed jointly with water in the tank, and the spray mixture obtained is applied.

25

A joint herbicidal formulation of the combination according to the invention of the components A) and B) has the advantage that it can be applied more easily because the amounts of the components have already been adjusted with respect to one another to the correct ratio. Moreover, the auxiliaries of the formulation can be selected to suit each other in the best possible way, while a tank mix of various formulations may result in undesirable combinations of auxiliaries.

A. **Formulation examples**

- a) A dust (WP) is obtained by mixing 10 parts by weight of an active compound/active compound mixture and 90 parts by weight of talc as inert substance and comminuting the mixture in a hammer mill.
- 5 b) A wettable powder (WG) which is readily dispersible in water is obtained by mixing 25 parts by weight of an active compound/active compound mixture, 64 parts by weight of kaolin-containing quartz as inert substance, 10 parts by weight of potassium lignosulfonate and 1 part by weight of sodium oleoylmethyltaurate as wetting agent and dispersant, and grinding the mixture in a pinned-disk mill.
- 10 c) A dispersion concentrate which is readily dispersible in water is obtained by mixing 20 parts by weight of an active compound/active compound mixture with 6 parts by weight of alkylphenol polyglycol ether (Triton X 207), 3 parts by weight of isotridecanol polyglycol ether (8 EO) and 71 parts by weight of paraffinic mineral oil (boiling range for example approximately 255 to 277°C) and grinding the mixture in a ball mill to a fineness of below 5 microns.
- 15 d) An emulsifiable concentrate (EC) is obtained from 15 parts by weight of an active compound/active compound mixture, 75 parts by weight of cyclohexanone as solvent and 10 parts by weight of ethoxylated nonylphenol as emulsifier.
- 20 e) Water-dispersible granules are obtained by mixing 75 parts by weight of an active compound/active compound mixture, 10 parts by weight of calcium lignosulfonate, 5 parts by weight of sodium lauryl sulfate, 3 parts by weight of polyvinyl alcohol and 7 parts by weight of kaolin
- 25 grinding the mixture in a pinned-disk mill and granulating the powder in a fluidized bed by spraying on water as granulation liquid.

- f) Water-dispersible granules are also obtained by homogenizing and precommuting, in a colloid mill,
25 parts by weight of an active compound/active compound mixture,
5 parts by weight of sodium 2,2'-dinaphthylmethane-6,6'-disulfonate,
5 parts by weight of sodium oleoylmethyltaurinate,
1 part by weight of polyvinyl alcohol,
17 parts by weight of calcium carbonate and
50 parts by weight of water,
subsequently grinding the mixture in a bead mill and atomizing and drying the
10 resulting suspension in a spray tower by means of a single-substance nozzle.

B. Biological Examples

- Outdoors, crop plants were grown on plots of a size of from 5 to 10 m² on various
15 soils and under various climatic conditions, and the natural presence of harmful
plants and/or their seeds in the soil was utilized for the experiments. The treatment
with the compositions according to the invention or the herbicides A) and B) applied
individually was carried out after emergence of the harmful and the crop plants, in
general at the 2- to 4-leaf stage. The active compounds or active compound
20 combinations, formulated as WG, WP or EC, was carried out by the post-emergence
method. After 2 to 8 weeks, visual evaluation was carried out in comparison with an
untreated comparative group. It was found that the compositions according to the
invention have synergistic herbicidal action against economically important mono-
and dicotyledonous harmful plants, i.e. that most of the compositions according to
25 the invention have higher, some considerably higher, herbicidal activity than the sum
of the activities of the individual herbicides. In addition, the herbicidal activities of the
compositions according to the invention exceed the expected values according to
Colby. In contrast, the treatment caused insignificant, if any, damage to the crop
plants.
30 If the observed activity values of the mixtures already exceed the formal sum of the
values for the trials with individual applications, they also exceed the expected value

according to Colby which is calculated using the following formula (cf. S. R. Colby; in Weeds 15 (1967) pp. 20 to 22):

$$E = \frac{A + B}{A \times B} \times 100$$

- 5 The figures denote:

A, B = Activity of Components A and B in percent, at a dosage of a and b gram of ai/ha, respectively.
 E = Expected value in % at a dosage of a+b gram of ai/ha.

- 10 The values observed in the experimental examples below exceed the expected values according Colby.

The abbreviations denote:

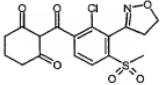
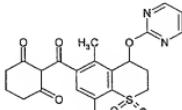
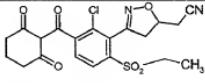
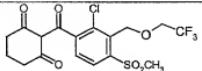
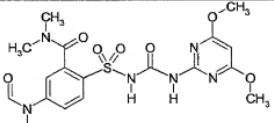
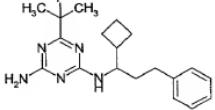
Harmful plants

15	CHEAL	<i>Chenopodium album</i>	ECHCG	<i>Echinocloa crus galli</i>
	GALAP	<i>Galium aparine</i>	KCHSC	<i>Kochia scoparia</i>
	LAMAM	<i>Lamium amplexicaule</i>	HBPU	<i>Pharbitis purpurea</i>
	POLCO	<i>Polygonum convolvulus</i>	POROL	<i>Portulaca oleracea</i>

- 20 Crop plants

HORVS	<i>Hordeum vulgaris</i>
TRZDU	<i>Triticum davam</i>
ZEMX	<i>Zea mays</i>

The following compounds were used in the examples:

A1	
A2	
A3	
A4	
B1	
B2	glufosinate
B3	
B4	iodosulfuron
B5	bromoxynil

Example B.I

Compound	Dosage [g of ai/ha]	KCHSC	
		found	value E (according to Colby)
A1	25	28	
B1	30	30	
	60	33	
A1 + B1	25 + 30	65	50
	25 + 60	72	52

Example B.II

Compound	Dosage [g of ai/ha]	PHBPU	
		found	value E (according to Colby)
A2	50	65	
B1	30	20	
A2 + B1	50 + 30	90	52

5

Example B.III

Compound	Dosage [g of ai/ha]	PHBPU	
		found	value E (according to Colby)
A2	100	45	
B2	500	43	
A2 + B2	100 + 500	94	67

Example B.IV

Compound	Dosage [g of ai/ha]	CHEAL	
		found	value E (according to Colby)
A2	100	34	
B2	500	60	
A2 + B2	100 + 500	100	74

Example B.V

Compound	Dosage [g of ai/ha]	POROL	
		found	value E (according to Colby)
A2	100	0	
B1	30	43	
A2 + B1	100 + 30	80	43

5

Example B.VI

Compound	Dosage [g of ai/ha]	CHEAL		HORVS
		found	value E (according to Colby)	found
A3	75	0		0
B3	100	30		0
A3+B3	75+100	100	30	0

Example B.VII

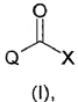
Compound	Dosage [g of ai/ha]	BRAPL		ZEAMX found
		found	value E (according to Colby)	
A3	75	65		0
B5	300	0		0
A3+B5	75+300	80	65	0

Example B.VIII

Compound	Dosage [g of ai/ha]	POROL		TRZDU found
		found	value E (according to Colby)	
A4	25	5		5
B4	2.5	20		15
A4+B4	25+2.5	60	24	15

Claims:

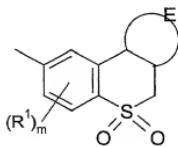
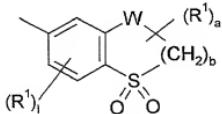
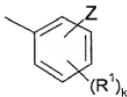
1. A herbicidal composition, comprising an effective amount of
A) at least one compound of formula (I) and its agriculturally customary salts
5 (Component A)



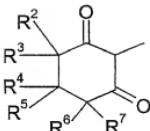
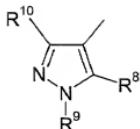
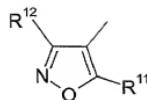
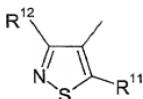
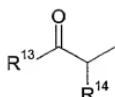
in which

10

- X is a radical X^1 , X^2 or X^3



- Q is a radical Q^1 , Q^2 , Q^3 , Q^4 or Q^5

(Q¹)(Q²)(Q³)(Q⁴)(Q⁵);

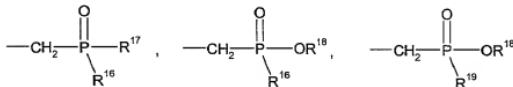
Z is a radical Z^1 , $\text{CH}_2\text{-}Z^1$ or Z^2 ;

- 5 Z^1 is a five- to ten-membered monocyclic or bicyclic saturated, partially saturated, fully unsaturated or aromatic ring which is attached via carbon or nitrogen and which, in addition to carbon atoms, contains 1, 2, 3 or 4 heteroatoms from the group consisting of oxygen, sulfur and nitrogen and which is unsubstituted or mono- or polysubstituted by halogen, cyano, nitro, cyano-(C₁-C₄)-alkyl, CO-R¹⁵, (C₁-C₄)-alkyl, halo-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkyl, (C₁-C₄)-alkoxy, halo-(C₁-C₄)-alkoxy, (C₁-C₄)-alkylthio, halo-(C₁-C₄)-alkylthio, di-(C₁-C₄)-alkylamino, by phenyl which is optionally mono- or polysubstituted by halogen, cyano, nitro, (C₁-C₄)-alkyl or halo-(C₁-C₄)-alkyl or by an oxo group;
- 10 Z^2 is (C₃-C₁₂)-cycloalkyloxy-(C₁-C₄)-alkyl, aryloxy-(C₁-C₄)-alkyl, heteroaryloxy-(C₁-C₄)-alkyl, heterocycl-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, heterocycl-(C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, aryl-(C₃-C₈)-cycloalkylthio-(C₁-C₄)-alkyl, heteroaryl-(C₃-C₈)-cycloalkylthio-(C₁-C₄)-alkyl, heterocycl-(C₃-C₈)-

cycloalkylthio-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylsulfinyl-(C₁-C₄)-alkyl, (C₃-C₈)-
cycloalkylsulfonyl-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylamino-(C₁-C₄)-alkyl, (C₃-C₈)-
cycloalkylsulfonyloxy-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylsulfonylamino-(C₁-C₄)-
alkyl, (C₃-C₈)-cycloalkylcarbonyl-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylcarbonyloxy-
5 (C₁-C₄)-alkyl, (C₃-C₈)-cycloalkoxycarbonyl-(C₁-C₄)-alkyl, (C₃-C₈)-
cycloalkylcarbonylamino-(C₁-C₄)-alkyl, (C₃-C₈)-cycloalkylaminocarbonyl-(C₁-
C₄)-alkyl, (C₄-C₁₂)-cycloalkyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylthio-(C₁-C₄)-
alkyl, (C₄-C₁₂)-cycloalkylsulfinyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylsulfonyl-(C₁-
C₄)-alkyl, (C₄-C₁₂)-cycloalkylamino-(C₁-C₄)-alkyl, (C₄-C₁₂)-
10 cycloalkylsulfonyloxy-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylsulfonylamino-(C₁-C₄)-
alkyl, (C₄-C₁₂)-cycloalkylcarbonyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylcarbonyloxy-
(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylcarbonyl-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkyl-
15 carbonylamino-(C₁-C₄)-alkyl, (C₄-C₁₂)-cycloalkylaminocarbonyl-(C₁-C₄)-alkyl,
arylothio-(C₁-C₄)-alkyl, arylsulfinyl-(C₁-C₄)-alkyl, arylsulfonyl-(C₁-C₄)-alkyl,
arylaminoo-(C₁-C₄)-alkyl, arylsulfonyloxy-(C₁-C₄)-alkyl, arylsulfonylamino-
(C₁-C₄)-alkyl, arylcarbonyl-(C₁-C₄)-alkyl, arylcarbonyloxy-(C₁-C₄)-alkyl,
20 aryloxycarbonyl-(C₁-C₄)-alkyl, arylcarbonylamino-(C₁-C₄)-alkyl,
arylamino-carbonyl-(C₁-C₄)-alkyl, heteroarylothio-(C₁-C₄)-alkyl, heteroarylsulfinyl-
(C₁-C₄)-alkyl, heteroarylsulfonyl-(C₁-C₄)-alkyl, heteroarylamino-(C₁-C₄)-alkyl,
heteroarylsulfonyloxy-(C₁-C₄)-alkyl, heteroarylsulfonylamino-(C₁-C₄)-alkyl,
heteroarylcarbonyl-(C₁-C₄)-alkyl, heteroarylcarbonyloxy-(C₁-C₄)-alkyl,
25 heteroaryloxy carbonyl-(C₁-C₄)-alkyl, heteroarylcarbonylamino-(C₁-C₄)-alkyl,
heteroarylaminocarbonyl-(C₁-C₄)-alkyl, heterocyclithio-(C₁-C₄)-alkyl, hetero-
cyclicsulfinyl-(C₁-C₄)-alkyl, heterocyclicsulfonyl-(C₁-C₄)-alkyl,
heterocyclalamino-(C₁-C₄)-alkyl, heterocyclicsulfonyloxy-(C₁-C₄)-alkyl,

heterocyclsulfonylamino-(C₁-C₄)-alkyl, heterocyclcarbonyl-(C₁-C₄)-alkyl,
 heterocyclcarbonyloxy-(C₁-C₄)-alkyl, heterocycloxycarbonyl-(C₁-C₄)-alkyl,
 heterocyclcarbonylamino-(C₁-C₄)-alkyl, heterocyclaminocarbonyl-(C₁-C₄)-
 alkyl, halo-(C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkylsulfinyl-(C₁-C₄)-
 5 alkyl, halo-(C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkylamino-(C₁-C₄)-
 alkyl, halo-(C₁-C₄)-alkylsulfonyloxy-(C₁-C₄)-alkyl, halo-(C₁-C₄)-
 alkylsulfonylamino-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl, halo-
 (C₁-C₄)-alkylcarbonyloxy-(C₁-C₄)-alkyl, halo-(C₁-C₄)-alkyloxycarbonyl-(C₁-C₄)-
 alkyl, halo-(C₁-C₄)-alkylcarbonylamino-(C₁-C₄)-alkyl, halo-(C₁-C₄)-
 10 alkylaminocarbonyl-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, aryl-(C₁-
 C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl, aryl-(C₁-
 C₄)-alkylamino-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylsulfonyloxy-(C₁-C₄)-alkyl, aryl-
 (C₁-C₄)-alkylsulfonylamino-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylcarbonyl-(C₁-C₄)-
 alkyl, aryl-(C₁-C₄)-alkylcarbonyloxy-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkyloxycarbonyl-
 15 (C₁-C₄)-alkyl, aryl-(C₁-C₄)-alkylcarbonylamino-(C₁-C₄)-alkyl, aryl-(C₁-C₄)-
 alkylaminocarbonyl-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkylthio-(C₁-C₄)-alkyl,
 heteroaryl-(C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkylsulfonyl-
 (C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkylamino-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-
 alkylsulfonyloxy-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkylsulfonylamino-(C₁-C₄)-
 20 alkyl, heteroaryl-(C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-
 alkylcarbonyloxy-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-alkyloxycarbonyl-(C₁-C₄)-alkyl,
 heteroaryl-(C₁-C₄)-alkylcarbonylamino-(C₁-C₄)-alkyl, heteroaryl-(C₁-C₄)-
 alkylaminocarbonyl-(C₁-C₄)-alkyl, heterocycl-(C₁-C₄)-alkylthio-(C₁-C₄)-alkyl,
 heterocycl-(C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, heterocycl-(C₁-C₄)-
 25 alkylsulfonyl-(C₁-C₄)-alkyl, heterocycl-(C₁-C₄)-alkylamino-(C₁-C₄)-alkyl,

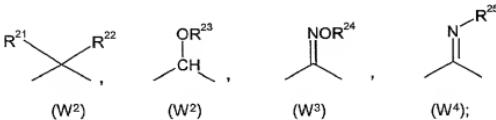
heterocyclyl-(C₁-C₄)-alkylsulfonyloxy-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylsulfonylamino-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylcarbonyloxy-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkoxycarbonyl-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylcarbonylamino-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylcarbonylamino-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkylaminocarbonyl-(C₁-C₄)-alkyl,



or O-(CH₂)_p-O-(CH₂)_wR²⁰;

10

W is one of the groups W¹, W², W³ or W⁴



15 Y is O or NR²⁶;

E together with the two carbon atoms to which it is attached is a phenyl ring or a 5- or 6-membered heterocycle which may be saturated, partially saturated, fully unsaturated or aromatic and contains 1, 2 or 3 heteroatoms from the group consisting of oxygen, sulfur and nitrogen, where the heterocycle contains not more than 2 sulfur or 2 oxygen atoms and the phenyl ring or heterocycle which contains the group E is unsubstituted or mono- or polysubstituted by (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy, halo-(C₁-C₆)-alkoxy, (C₁-C₆)-alkylthio, halo-(C₁-C₆)-alkylthio, (C₁-C₆)-alkylsulfinyl, halo-(C₁-C₆)-alkylsulfinyl, (C₁-C₆)-

alkylsulfonyl, halo-(C₁-C₆)-alkylsulfonyl, aminosulfonyl, (C₁-C₆)-alkylaminosulfonyl, (C₂-C₁₂)-dialkylaminosulfonyl, NR²⁶R²⁷, (C₂-C₆)-alkoxyalkyl, (C₂-C₆)-alkoxycarbonyl, (C₂-C₆)-alkylicarbonyl, halogen, cyano, nitro or by pyridyl;

5

R¹ is halogen, cyano, nitro, (Y)_n-S(O)_q-R²⁸, (Y)_n-CO-R¹⁵ or is (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl or (C₁-C₄)-alkoxy which are substituted by V halogen atoms or K (C₁-C₄)-alkoxy groups;

10 R², R³, R⁵ and R⁷ independently of one another are hydrogen or (C₁-C₆)-alkyl;

R⁴ is hydrogen, or is (C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl, tetrahydropyran-3-yl, tetrahydropyran-4-yl or tetrahydrothiopyran-3-yl which are substituted by K radicals from the group consisting of halogen, (C₁-C₆)-alkylthio and (C₁-C₆)-alkoxy;

R⁶ is hydrogen, (C₁-C₆)-alkyl or CO₂R¹⁵, or

R⁴ and R⁶ together form a bond or a three- to six-membered carbocyclic ring;

20

R⁸ is OR²⁹, thio, (C₁-C₆)-alkylthio, halo-(C₁-C₆)-alkylthio, (C₁-C₆)-alkylsulfinyl, halo-(C₁-C₆)-alkylsulfinyl, (C₁-C₆)-alkylsulfonyl, halo-(C₁-C₆)-alkylsulfonyl, halogen, NR²⁶R²⁷, phenylthio, phenylsulfonyl or phenylcarbonylmethylthio, where the three last-mentioned groups are substituted by K radicals from the group consisting of (C₁-C₃)-alkyl, halogen, cyano and nitro;

25

R^9 is hydrogen, (C_1-C_6)-alkyl, halo-(C_1-C_6)-alkyl, (C_2-C_6)-alkenyl, (C_2-C_6)-alkynyl, $CH_2CH_2OR^{30}$ or is phenyl or benzyl which are substituted in the phenyl ring by K radicals from the group consisting of (C_1-C_3)-alkyl, halogen, cyano and nitro;

5 R^{10} is hydrogen, (C_1-C_6)-alkyl, halo-(C_1-C_6)-alkyl, (C_1-C_6)-alkoxy, halo-(C_1-C_6)-alkoxy, halogen, cyano or nitro;

R^{11} is hydrogen, (C_1-C_6)-alkyl, halo-(C_1-C_6)-alkyl, (C_3-C_6)-cycloalkyl or halo-(C_3-C_6)-cycloalkyl;

10 R^{12} is hydrogen, (C_2-C_6)-alkoxycarbonyl, halo-(C_2-C_6)-alkoxycarbonyl, $S(O)_qR^{28}$, CO_2H or cyano;

15 R^{13} is (C_1-C_6)-alkyl, halo-(C_1-C_6)-alkyl, halo-(C_3-C_6)-cycloalkyl or is (C_3-C_6)-cycloalkyl which is substituted by a radical (C_1-C_3)-alkyl;

20 R^{14} is cyano, (C_2-C_6)-alkoxycarbonyl, (C_2-C_6)-alkylcarbonyl, $S(O)_qR^{30}$ or $C(O)NR^{26}R^{27}$;

25 R^{15} is (C_1-C_4)-alkyl, halo-(C_1-C_4)-alkyl or $NR^{26}R^{27}$;

R^{16} and R^{17} independently of one another are (C_1-C_6)-alkyl, (C_2-C_6)-alkenyl, (C_2-C_6)-alkynyl, halo-(C_1-C_6)-alkyl, aryl or aryl-(C_1-C_6)-alkyl which are substituted by K radicals from the group consisting of halogen, cyano, nitro, (C_1-C_6)-alkyl, halo-(C_1-C_6)-alkyl, (C_1-C_6)-alkoxy and halo-(C_1-C_6)-alkoxy;

R^{18} and R^{19} independently of one another are hydrogen or R^{16} , or

R^{18} and R^{19} together form a (C_2 - C_5)-alkenyl chain;

R^{20} is (C_1 - C_4)-alkyl, (C_2 - C_8)-alkenyl, (C_2 - C_6)-alkynyl, halo-(C_1 - C_6)-alkyl, halo-(C_2 - C_6)-alkenyl, halo-(C_2 - C_6)-alkynyl, (C_1 - C_6)-alkoxy, (C_2 - C_6)-alkenyloxy, (C_2 - C_6)-

5 alkynyoxy, halo-(C_1 - C_6)-alkoxy, halo-(C_2 - C_6)-alkynyoxy or halo-(C_2 - C_6)-alkenyloxy;

R^{21} is hydrogen, (C_1 - C_4)-alkyl, halo-(C_1 - C_4)-alkyl, Z^1 , $O-Z^1$, $S-Z^1$ or $NR^{30}Z^1$;

10 R^{22} is hydrogen, (C_1 - C_4)-alkyl, (C_2 - C_4)-alkenyl or (C_2 - C_4)-alkynyl, or

R^{21} , R^{22} together with the carbon atom to which they are attached form a carbonyl group or an $O-CH_2CH_2-O$ group which is substituted by 9 (C_1 - C_3)-alkyl radicals, or R^{21} is hydrogen and R^{22} is Z^1 ;

15 R^{23} and R^{24} independently of one another are (C_1 - C_6)-alkyl, halo-(C_1 - C_6)-alkyl, (C_3 - C_6)-cycloalkyl, (C_2 - C_6)-alkenyl, halo-(C_2 - C_6)-alkenyl, (C_2 - C_6)-alkynyl, halo-(C_2 - C_6)-alkynyl or Z^1 ;

20 R^{25} is Z^1 ;

R^{26} is hydrogen or (C_1 - C_6)-alkyl;

R^{27} is hydrogen, (C_1 - C_6)-alkyl or (C_1 - C_6)-alkoxy, or

25 R^{26} and R^{27} together form $(CH_2)_2$, $(CH_2)_3$, $(CH_2)_4$, $(CH_2)_5$, or $(CH_2)_2O(CH_2)_2$;

R²⁸ is (C₁-C₄)-alkyl, halo-(C₁-C₄)-alkyl or NR²⁶R²⁷;

R²⁹ is hydrogen, (C₁-C₆)-alkyl, halo-(C₁-C₆)-alkyl, (C₂-C₆)-alkoxyalkyl, formyl, (C₂-C₆)-alkylcarbonyl, (C₂-C₆)-alkoxycarbonyl, C(O)NR²⁶R²⁷, (C₁-C₆)-alkylsulfonyl, 5 halo-(C₁-C₆)-alkylsulfonyl, or is phenyl, benzyl, benzoyl, CH₂C(O)phenyl or phenylsulfonyl which are substituted in the phenyl ring by K radicals from the group consisting of (C₁-C₃)-alkyl, halogen, cyano and nitro;

R³⁰ is (C₁-C₆)-alkyl or (C₁-C₆)-alkoxy;

10

- a is 0, 1, 2, 3 or 4;
- b is 1 or 2;

15

- k is 0, 1, 2 or 3;
- l is 0, 1 or 2;

20

- m is 0 or 1;
- n is 0 or 1;
- p is 1, 2 or 3;

25

- q is 0, 1 or 2;
- v is 0, 1, 2, 3, 4 or 5;

30

and

- B) at least one compound (Component B) from one of the groups
B-a) herbicides which are selectively active in cereals against monocotyledonous and/or dicotyledonous harmful plants,
5 B-b) herbicides which are selectively active in corn against monocotyledonous and/or dicotyledonous harmful plants,
B-c) herbicides which are selectively active in rice against monocotyledonous and/or dicotyledonous harmful plants,
B-d) herbicides which are nonselectively active in land which is not under
10 cultivation and/or selectively active in transgenic crops against monocotyledonous and/or dicotyledonous harmful plants,

where this composition comprises the compounds of the formula (I) or their salts (Component A) and the compounds of groups B-a) to B-d) (Component B) in a ratio
15 by weight of from 1:2000 to 2000:1.

2. A herbicidal composition as claimed in claim 1, which comprises as Component A) a compound of the formula I in which Q is one of the radicals Q^1 , Q^2 ,
 Q^3 or Q^4 .
- 20 3. A herbicidal composition as claimed in claim 1, which comprises as Component A) a compound of the formula I in which Q is one of the radicals Q^1 , Q^2 or Q^3 .
- 25 4. A herbicidal composition as claimed in claim 1, which comprises as Component A) a compound of the formula I in which Q is one of the radicals Q^1 or Q^3 .
- 30 5. A herbicidal composition as claimed in claim 1, which comprises as Component A) a compound of the formula I in which X is a radical X^1 .

6. A herbicidal composition as claimed in claim 1, which comprises as Component B) at least one herbicide from the group B-a), consisting of amidosulfuron, bentazone, bromoxynil, carfentrazone-ethyl, chlortoluron, clodinafop, cloransulam-methyl, diclofop-methyl, fenoxaprop-P-ethyl, florasulam, flufenacet, 5 fluoroglycofen-ethyl, flupyrsulfuron-methyl-sodium, iodosulfuron, isoproturon, metsulfuron, pendimethalin, pyraflufen-ethyl, sulfosulfuron, thifensulfuron, tralkoxydim, tribenuron, 2-amino-4-(1-fluoro-1-methylethyl)-6-(3-phenyl-1-cyclobutyl-1-propylamino)-1,3,5-triazine and N-[(4,6-dimethoxypyrimidin-2-yl)-aminocarbonyl]-2-methoxycarbonyl-5-methylsulfonylaminomethylbenzenesulfonamide.
- 10 7. A herbicidal composition as claimed in claim 6, which comprises bromoxynil, clodinafop, fenoxaprop-P-ethyl, iodosulfuron, pyraflufen-ethyl, tralkoxydim, 2-amino-4-(1-fluoro-1-methylethyl)-6-(3-phenyl-1-cyclobutyl-1-propylamino)-1,3,5-triazine or N-[(4,6-dimethoxypyrimidin-2-yl)-aminocarbonyl]-2-methoxycarbonyl-5-
- 15 15 methylsulfonylaminomethylbenzenesulfonamide.
8. A herbicidal composition as claimed in claim 1, which comprises as Component B) at least one herbicide from the group B-b), consisting of acetochlor, alachlor, atrazine, bromoxynil, carfentrazone-ethyl, dicamba, diflufenzopyr, 20 dimethenamide, flufenacet, flumetsulam, fluthiacet-methyl, halosulfuron, imazamox, imazapyr, imazaquin, imazethapyr, iodosulfuron, metolachlor, metosulam, metribuzin, nicosulfuron, pethoxamide, pendimethalin, primisulfuron, prosulfuron, pyridate, rimsulfuron, thenylchlor, thifensulfuron-methyl, tritosulfuron and N-[(4,6-dimethoxypyrimidin-2-yl)-aminocarbonyl]-2-dimethylaminocarbonyl-5- 25 formylbenzenesulfonamide.
9. A herbicidal composition as claimed in claim 8, which comprises bromoxynil, dicamba, diflufenzopyr, iodosulfuron, nicosulfuron, rimsulfuron or N-[(4,6-dimethoxypyrimidin-2-yl)-aminocarbonyl]-2-dimethylaminocarbonyl-5- 30 formylbenzenesulfonamide.
10. A herbicidal composition as claimed in claim 1, which comprises as Component B) at least one herbicide from the group B-c), consisting of anilofos,

- azimsulfuron, benfuresate, bensulfuron, bentazone, benthiocarb, bromobutide,
bispyribac-sodium, butachlor, cinosulfuron, clomazone, cyclosulfamuron,
ethoxysulfuron, esprocarb, imazosulfuron, KPP-314, pyribenzoxim, mefenacet,
molinate, oxaziclomefone, OK9701, oxadiargyl, pretilachlor, propanil, pyrazosulfuron,
5 quinclorac, thenylchlor, triclopyr and 1-(3-chloro-4,5,6,7-tetrahydropyrazolo-[1,5-a]-pyrid-2-yl)-5-(methylpropargylamino)-4-pyrazolylcarbonitrile.
11. A herbicidal composition as claimed in claim 10, which comprises
benfuresate, bensulfuron, ethoxysulfuron, molinate, oxaziclomefone or
10 1-(3-chloro-4,5,6,7-tetrahydropyrazolo-[1,5-a]-pyrid-2-yl)-5-(methylpropargylamino)-
4-pyrazolylcarbonitrile.
12. A herbicidal composition as claimed in claim 1, which comprises as
Component B) at least one herbicide from the group B-d), consisting of glufosinate,
15 glyphosate, imazamox, imazapyr, imazaquin, imazethapyr and sulfosate.
13. A herbicidal composition as claimed in claim 12, which comprises glufosinate
or glyphosate.
- 20 14. A herbicidal composition as claimed in claim 1, wherein the ratio by weight
A:B of the combined herbicides A) and B) is in the range from 1:20 to 50:1.
15. A herbicidal composition as claimed in claim 1, which comprises 0.1-99% by
weight of herbicides A) and B) and 99 to 0.1% by weight of formulation auxiliaries
25 which are customary in crop protection.
16. A method for controlling undesirable vegetation, which comprises applying
one or more herbicides A) with one or more herbicides B) to the harmful plants, to
parts thereof or to the area under cultivation, where the combination of the
30 herbicides A) and B) is defined as in any of claims 1 to 15.

17. The use of a combination of herbicides A) and B) as herbicidal composition for controlling undesirable vegetation, where the combination of the herbicides A) and B) is defined as in any of claims 1 to 15.

Abstract:

Synergistic herbicidal compositions comprising herbicides from the group of the hydroxyphenylpyruvate dioxygenase inhibitors

Herbicidal compositions comprising

- A) at least one compound from the group of the hydroxyphenylpyruvate dioxygenase inhibitors and
- B) at least one compound from the group
 - B-a) herbicides which are selectively active in cereals against monocotyledonous and/or dicotyledonous harmful plants,
 - B-b) herbicides which are selectively active in corn against monocotyledonous and/or dicotyledonous harmful plants,
 - B-c) herbicides which are selectively active in rice against monocotyledonous and/or dicotyledonous harmful plants,
 - B-d) herbicides which are nonselectively active in land which is not under cultivation and/or selectively active in transgenic crops against monocotyledonous and/or dicotyledonous harmful plants

are described.

The activity of these compositions is superior to that of the herbicides applied on their own.

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

As below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Synergistic herbicidal compositions comprising herbicides from the group of the hydroxyphenylpyruvate dioxygenase inhibitors

the specification of which

- is attached hereto
- was filed on as International Application
- and including all the amendments through the date hereof.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s) for which Priority is Claimed:

Federal Republic of Germany, 19950943.3 of October 22, 1999

And I hereby appoint

William F. Lawrence, Registration No. 28,029, of the firm FROMMER LAWRENCE & HAUG, LLP whose post office address is 745 Fifth Avenue, New York, New York 10151, or their duly appointed associate, my attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to file continuation and divisional applications thereof, to receive the Patent, and to transact all business in the Patent and Trademark Office and in the Courts in connection therewith, and specify that all communications about the application are to be directed to the following correspondence address:

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Direct all telephone calls
to: (212) 588-0800, to the
attention of:
William F. Lawrence

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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